SIEMENS

POLYDOROS SX 65/80

AX

Installation and Startup

POLYDOROS SX 65/80

KermaX Area Dose Product Measuring System

Print No.: RX63-055.033.04.04.02
Replaces: RX63-055.033.04.03.02

English
Doc. Gen. Date: 03.04

Document revision level

The document corresponds to the version/revision level effective at the time of system delivery. Revisions to hardcopy documentation are not automatically distributed.

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Table of Contents 3

General Remarks

This document was originally written in German.

Requirements and Remarks

- Prerequisite for system configuration using the Service PC are:
  - Basic knowledge such as PC handling and Windows program operation.
  - Completed POLYDOROS SX 65/80 training course
- The service software diskettes are included in the shipment (see System Binder).
- Service SW beginning with Version VD04A is required.

Safety Information

- The safety information described in Register 2 or Register 2 of the System Binder (yellow spine label) must be observed.

Safety Measures

- Prior to taking any action in the generator, switch it off at the D160 with the power **OFF** switch.

⚠CAUTION **Dangerous Voltage!**

➪ **When the generator is switched off, there is still line voltage present at the T1 transformer and at the D160 switch-on circuit. After switching off the generator, there is still approx. 600 V DC for the inverter present! This is indicated by LEDs V135 and V136 on the D110 and LED V89 is lit up on D220. The voltage dissipates in approximately 1 1/2 minutes to 0 V; the LEDs go off at approx. 30 V.**

- To switch power off to all parts of the system (generator and connected equipment), set the system switch to the **OFF** position.

Product-specific Remarks

Required Documents

- Startup Instructions beginning with V... POLYDOROS SX 65/80
- Operating Instructions for the KermaX area dose product test instrument

Required Tools

- Standard installation tool kit
- Service PC
- PC connection cable, 5 m, Part No. 99 00 440 RE999
- Dosimeter, e.g. DIADOS

Installing the KermaX Measuring Chamber

KermaX Measuring Chamber Integrated with Crosshairs

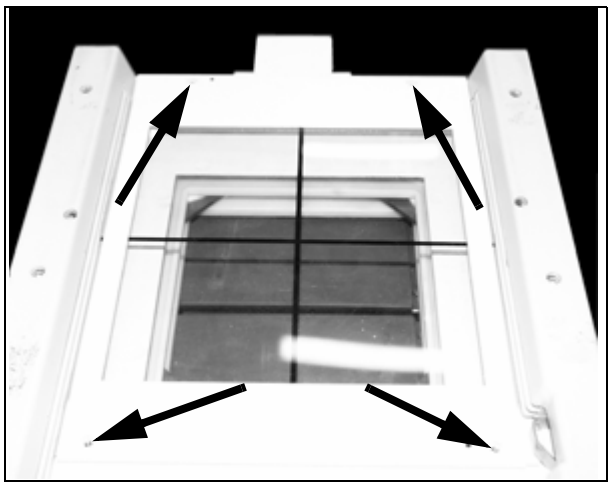

Fig. 1:

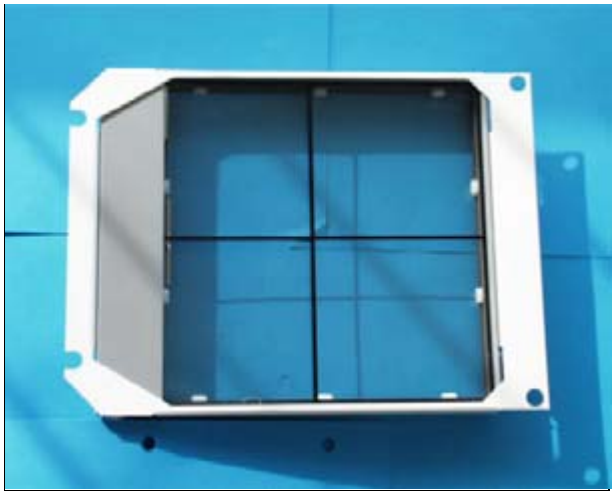

Fig. 2:

- When power is present, the collimator light localizer must be projected on a stable tabletop or a fixed panel; mark the centering cross on this surface.
- Remove the 4 screws with which the transparent plastic cover (Laxan panel with crosshairs) is secured to the metal frame (Fig. 1 / p. 6).
- Remove the plastic cover with the mounting frame.
- Remove the centering pins and plastic cover from the mounting frame; they are no longer needed.
- Insert the KermaX dose measuring chamber with crosshairs (Fig. 2 / p. 6) in the shaft of the N collimator and loosely secure it in place with the mounting frame (without the Plexiglas window and centering pins) and the 4 screws (Fig. 1 / p. 6) (the dose measuring chamber must still be adjusted).
- Adjust the projected light localizer centering cross (by moving the dose measuring chamber) so that it is lined up with the previously made mark on the surface.
- After completing this adjustment of the centering cross, the dose measuring chamber is secured in place using the 4 screws on the mounting frame.
- Secure the connection cable to the KermaX measuring chamber to the wiring harness with cable ties.

KermaX Measuring Chamber with Rails

- Insert the KermaX measuring chamber with rails into the collimator until the side latch snaps into place.

Connecting the Cables

Cabling with POLYDOROS SX65/80

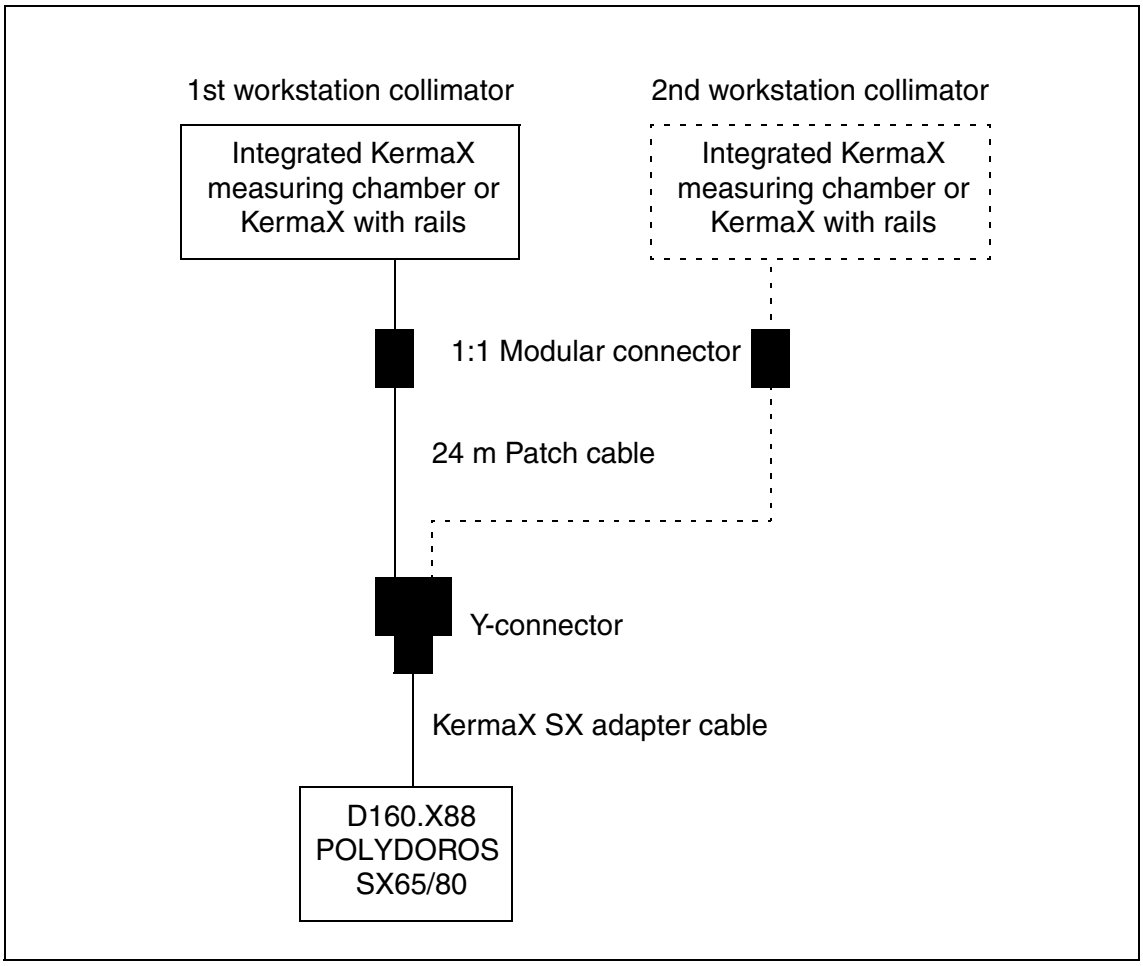

Fig. 3:

- Connect the KermaX SX adapter cable to the POLYDOROS SX65/80.
  - Plug in the KermaX adapter cable on the D160.X88.
  - Attach the two cables from the D160.X88 KermaX adapter cable to the Lambda power supply at 0V and 24V per the designations using cable terminals.
  - Connect the external shielding of the adapter cable (Fig. 4 / p. 8) to housing ground (Fig. 5 / p. 8) of the POLYDOROS SX65/80 (below the D160).

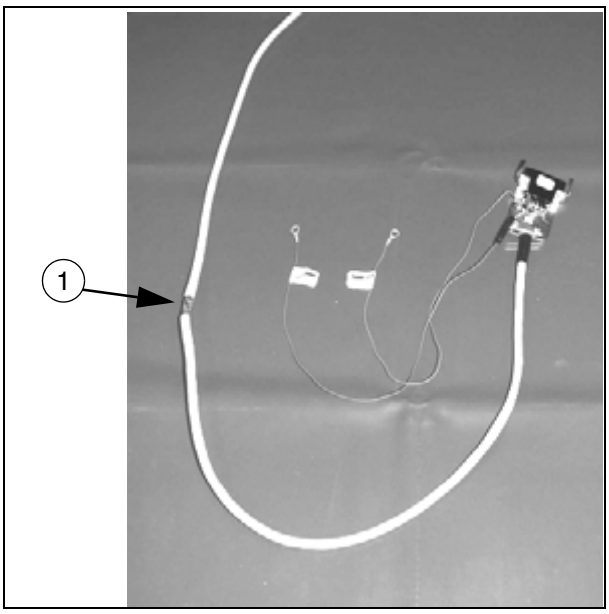

Fig. 4:
Pos. 1 External shielding

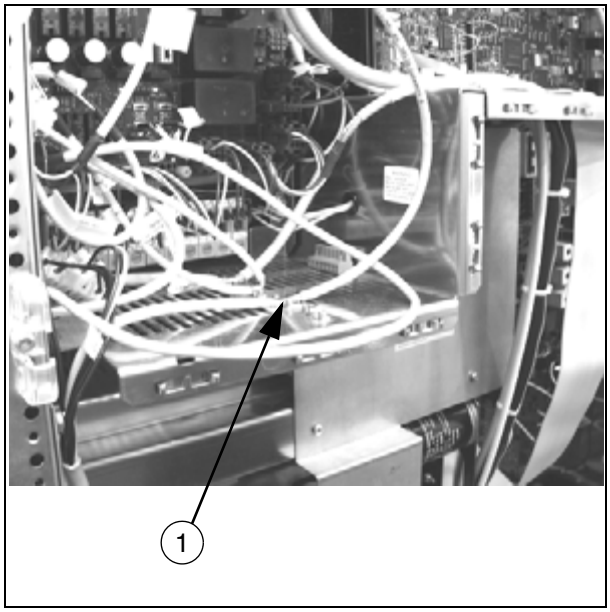

Fig. 5:
Pos. 1 Connect the external shielding to the housing ground with a cable clamp

- Using the 1:1 modular connector, connect the 24 m patch cable in the corrugated hose to the KermaX chamber.

- In the POLYDOROS SX, connect the adapter cable to the 24 m patch cable using the Y-connector.
- If a 2nd workstation (KermaX measuring chamber) is connected:
  - Connect the RJ45 connector from the KermaX measuring chamber and the 24m patch cable using a 1:1 modular connector.
  - Connect the 24m patch cable and the KermaX adapter cable using the Y-connector.

Adapting the System Configuration

- Connect Com1 of the Service PC to D320.XCU.
- Switch on the system.
- Start the Service SW.
- Window "Configure:Site Structure:Edit System":
  - Configure the KermaX dose area product test instrument (corresponds to the Diamentor K1/K2) according to the connected workstation (arrow/Fig. 6 / p. 10).

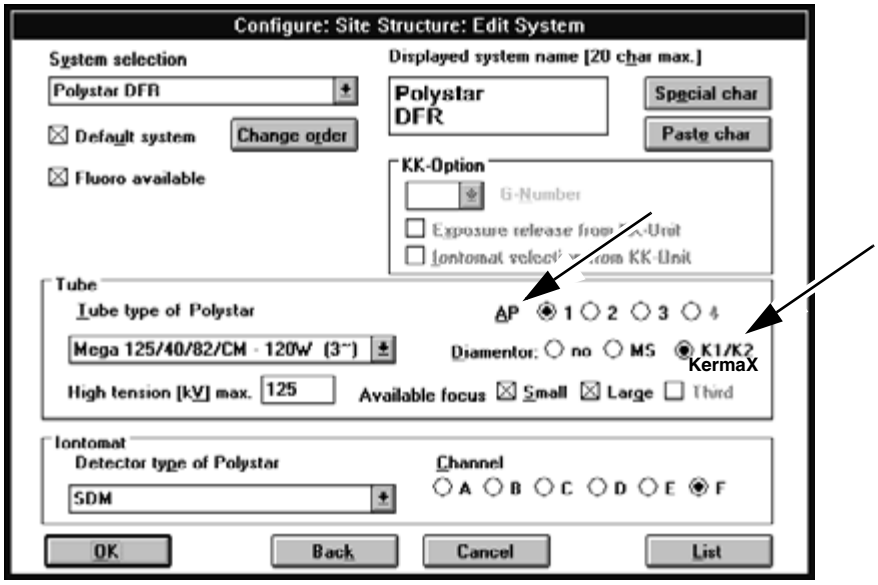

Fig. 6:

- Exit the window with **OK**.
- Also save the new configuration on the backup diskette.

Check of the Area Dose Product (FDP) Test Instrument

Test Conditions

- Set the usual SID (if possible, approx. 1 m).
- Set the exposure data to approx. 70 kV, 20 mAs.

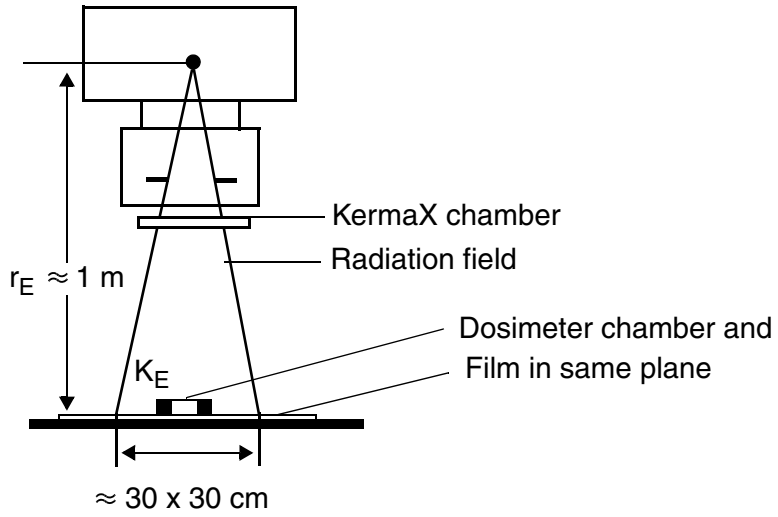

Fig. 7:

NOTE

The FDP can be determined in any plane of the beam path; however, it is necessary that the dose and the radiation field size be determined in one and the same plane!

Brief Description of the Test

- Set the usual SID and collimate a radiation field of approx. 30 x 30 cm.
- Place the dose measuring chamber in the beam path, trigger exposure and measure the dose K_E.
- Determine the radiation field size in the measurement plane (film or light localizer).
- Area dose product = calculate the dose x of the exposed area.
- Compare the calculated value with the display of the FDP test instrument and determine the difference.

Test Procedure

- Set the usual SID; if possible approx. 1 m.
- Place the dose measuring chamber in the beam path:
  - **for OT units, on the tabletop.**
  - **for UT units, on the back wall of the spotfilm device.**
- If possible, switch off automatic formatting and collimate a radiation field of approx. 30 x 30 cm in the measuring plane.

- Set approx. 70 kV and 20 mAs as the exposure data.
- It is also possible to work with automatic formatting if free setting is not possible. When this is done, cover the dominant (after the dosimeter chamber) with Cu, etc. so that a sufficiently large FDP results.

NOTE **There may be no attenuation layers between the Diamentor chamber and the dosimeter chamber!**

- Set the area dose measurement instrument to "zero" and trigger an exposure.
- The displayed area dose product must be at least two digits, if needed, change the mAs accordingly and repeat the exposure. Record the area dose product.
- Record the selected values for U_a and Q_a and the measured dose K_E (Q_a only with free setting or record the mAs post display).

Remark: The FDP can also be determined in fluoroscopy mode. Of course, the dosimeter must then be set to a dose measurement range and not to the dose rate.

- Place a film envelope or a cassette with film in the same plane as the dosimeter chamber.
- Without changing the collimation, expose the film, develop it and measure the radiation field size. With OT X-ray tube units, the light localizer field can also be measured if the light field and the radiation field are well matched.
- If neither the light field nor the film is available, if necessary the radiation field size can also be determined using the centering cross (under fluoroscopy or using an exposure) on the monitor.
- Calculate the radiation field size in cm^2: the formula depends on the field shape (see the Certificate).

Evaluation

- If necessary, convert the displayed area dose product FDP_a to the unit cGy x cm^2 (for conversion factors, see the Certificate).
- From the area of the measured radiation field and the measured dose K_E, the calculated area dose product FDP_g is calculated and recorded according to the formula $FDP_g = K_E \times A$.
- The difference between the measured and the display area dose product is calculated relative to the measured area dose product:

$$\text{Difference in \%} = \frac{(FDP_a - FDP_g) \times 100}{FDP_g}$$

The limit value is ± 30%

Test Certificate

Data for the tested medical product with test functions	
Designation:	
Mod. No.:	Serial No.:

Test conditions and setting values		
U_a = kV	Q_a = mAs	r_E = cm

Measurement values, determined values	
Exposure dose K_E = ≙ cGy	Radiation field size in meas. plane ***1** A = x = cm^2

Determined $FDP_g = K_E$ x A = x = cGy x cm^2
Displayed FDP_a = ( ) = cGy x cm^2 Unit

Difference between the determined and displayed FDP
Difference = $\frac{(FDP_a - FDP_g) \times 100}{FDP_g} = \frac{(-) \times 100}{} =$ %
The tested instrument meets the requirements: yes ☐ ; no ☐

Fig. 8:

Tolerance of the difference ≤ ± 30%

***1** Radiation field size A (cm^2)

with rectangular collimation A = l x b

Conversion factors: 1 cGy x cm^2 ≙ 10 mGy x cm^2 ≙ 10,000 µ Gy x cm^2

1 cGy x cm^2 ≙ 8.7 mGy x cm^2 ≙ 8,700 µ Gy x cm^2

Remarks: _____

_____

Tester: Name: _____

Address: _____

_____

Signature: _____

Date: _____

Checking the Luminous Intensity (only for USA and Canada)

The luminous intensity of the OT collimator must be checked in all systems with the KermaX. Measurement of the luminous intensity is performed in the 4 quadrants of the projected centering cross.

- The measurement is performed at an SID of 100 cm using the KermaX dose measuring chamber and three-field lung template. For the ICONOS R200, use a backing so that the SID of 100 cm to the measuring plane can be maintained.
- Collimate to 500mm x 500mm. For the ICONOS R200, the DSA collimator can be opened to only 450mm x 450mm.
- The measurement is performed in the center of the quadrants. Perform each of the measurements once with the light localizer switched on, and once with the light localizer switched off.
- The measurement result of luminous intensity in a particular “quadrant without the light localizer” must be subtracted from the measurement of the luminous intensity of the same “quadrant with light localizer”.
- Add the 4 values that have been calculated and calculate an average value. The result is the relevant measurement value.
- Reference value in systems with KermaX >= 170 Lux (>= 15.8 foot candle)
- If the required value is not reached, replace the lamp (Part No.: 58 92 075). When replacing it, do not touch the lamp with your fingers or allow it to get any dirt on it.

Displays and Test Points on the Calibration Board

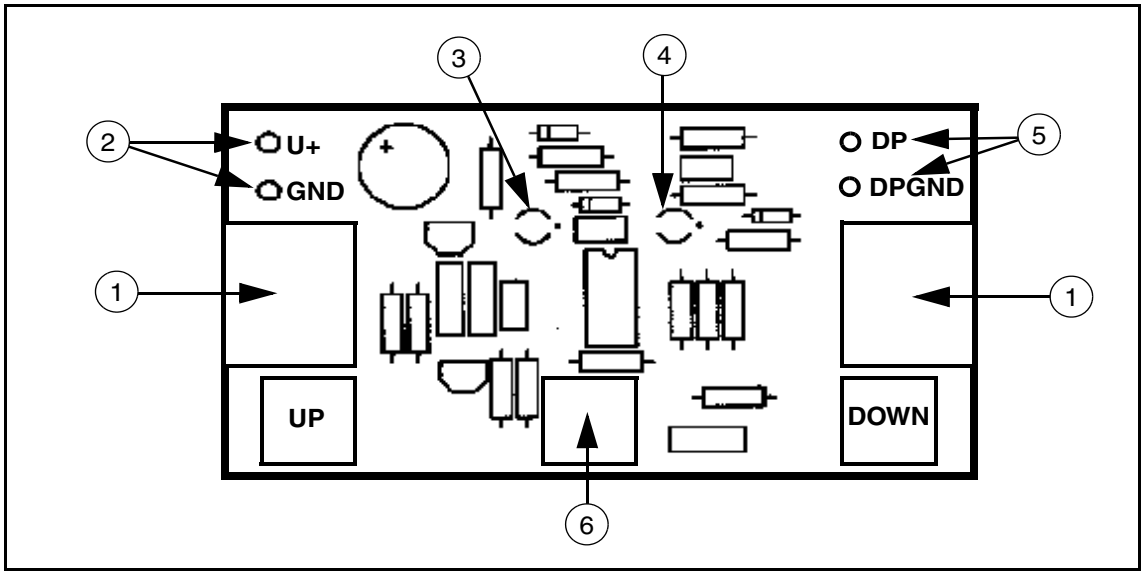

Fig. 9:

Pos. 1	RJ45 socket
Pos. 2	Power supply test points
Pos. 3	Green LED = power supply > 12 V
Pos. 4	Red LED = power supply between 9 V and 12 V
Pos. 5	Dose pulse test points
Pos. 6	Test

Checking the Power Supply Voltage

- Test points U+ and GND = 24V
- Green LED must go on = power supply voltage > 12V

Checking the Dose Pulses

- Test points DP (dose pulse signal plus) and DPGND (reference of dose pulse signal ground).

Quick Check of the Area Dose Product

- Trigger a standard shot using the following data:
  - SID = 115 cm
  - Open the collimator to18 x 24 cm
  - kV = 73
  - mAs = 20
- Dose area product display = approx. 37.5 cGy x cm^2, tolerance +/-10%.

Performing the Calibration

Calibration is performed by making an intermediate circuit of the supplied calibration board between the external display unit and the KermaX-plus. When doing this, the connection is made via the two RJ45 sockets on both sides of the calibration board.

NOTE

In systems with 2 KermaX measuring chambers, during calibration (intermediate circuit of the supplied calibration board), disconnect the measuring chamber that is not being calibrated from the Y connector.

Test Conditions

- Standard SID (if possible, approx. 1 m).
- Exposure data, approx. 100 kV, 20 mAs.

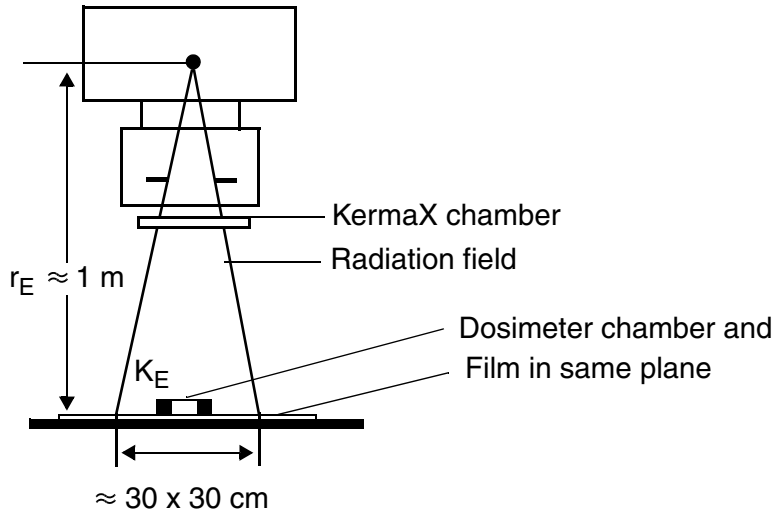

Fig. 10:

NOTE

The FDP can be determined in any plane of the beam path; however, it is necessary that the dose and the radiation field size be determined in one and the same plane!

Procedure

1. Call up the test number via the calibration board and make a not of it. To do this, usually the middle push-button on the board is pressed, but not longer than for 10 sec.
2. Determine the field size in the plane (orthogonal to the center beam direction) at the location in which the reference chamber is located: switch on the light localizer and use a rule to measure the length and width of the light field and calculate the area by multiplication. A more exact method is to make an exposure at the height of the reference chamber and then measuring the film density. If a semi-conductor detector is being

used as the reference system, multiply the result o the Kermax by the atmospheric pressure/temperature factor. Otherwise, a difference of up to 6% to the factory calibration can occur.

3. Set the exposure parameters at the control console and trigger an exposure (to assure that it is possible to compare the factory calibration with the calibration made on site, the exposure must be made at 100 kV).
4. Following the exposure, read the measurement values on both test instruments and make a note of the values:

   e.g. Reference dosimeter display = 26.83 mGy

   KermaX-plus display = 2815 $mGycm^2$

5. Calculate the reference area dose product:

   Measured field size for the reference chamber: 100 cm^2 (10 x 10 cm field).

   Reference dose: 26.83 mGy

   Reference area dose product:= 26.83 mGy x 100 cm^2 = 2683 $mGycm^2$
6. To be able to correct the test value in a targeted manner, a new value for the test pulses must be calculated.

   For this, the following formula is used:

   Reference value / chamber value = correction factor

   In the example: 2683 $mGycm^2$ / 2815 $mGycm^2$ = 0.953

   Current test value x correction factor = new test value.

   In the example: 1000 x 0,953 = 953
7. The newly calculated test value is now set on the calibration board by pressing the push-buttons labeled UP and DOWN on the calibration board (press 1 time= approx. 0.5%)

   In the example: 953 - 1000 = -47, i.e. press the DOWN push-button approx. 10 times.

   Now trigger the calibration exposure again. The value should now be within the specified tolerance.
8. If this is not the case, proceed according to Points 3) to 7), repeat as often as necessary until the result is acceptable.
9. By pressing the UP and DOWN keys, the test value that is provided does not change by more than 1000. To reset to this value, the middle push-button is now pressed and held for at least 12 s. By pressing again on the middle push-button (1s<t<10s), the system will again provide a test value of 1000.
10. The KermaX-plus is used in normal clinical conditions without the calibration board. For this reason, remove the calibration board again following the test.

NOTE **10 $mGycm^2$ = 1 $cGycm^2$ = 1 μGym^2**

Chapter	Section	Changes
Installation and Connection	KermaX Measuring Chamber Integrated with Crosshairs	Part number deleted
Installation and Connection	KermaX Measuring Chamber with Rails	Part number deleted

20 Changes to Previous Version